

Pattern of posterior segment injuries after ocular trauma at the vitreoretinal unit at Kikuyu Eye Unit, Kenya

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ABSTRACT

Background: Ocular trauma is a significant cause of monocular blindness worldwide. Eye injuries involving the posterior segment have been a matter of concern particularly due to the related poor visual outcome. These injuries require specialised intervention and follow up care to achieve best possible visual outcome.

Objective: This study aimed to give baseline information on pattern of posterior segment eye injuries in the East Africa set up.

Design: Retrospective case series of eye injuries involving posterior segment treated at Kikuyu Eye Unit, a tertiary referral eye hospital in Kenya between 1st January 2010 and 31st December 2014.

Results: One hundred and six eyes of 102 patients were reviewed, including 25 children. Seventy three patients (71.6%) were male and majority were in the 31-40 years age group. The most known circumstance of injury was road traffic accident in 9 (8.8%) patients. Metal was the most common agent causing these injuries in 15 (14.7%) eyes. Seventy nine eyes (74.5%) had closed globe injuries. Retinal detachment and vitreous haemorrhage were the most common findings, at 49 (46.2%) and 47 (44.3%) eyes respectively. Eighty nine eyes (84.0%) were blind at initial review with presenting vision acuity <3/60.

Conclusion: Ocular injuries involving the posterior segment were most common in young males. Closed globe injuries were the most common type of injuries (75%). Most eyes were blind at presentation indicating the severity of these injuries and need for specialised intervention.

Key words: Ocular trauma, Posterior segment injury in East Africa

INTRODUCTION

Ocular trauma is a major cause of significant ocular morbidity¹. Posterior segment ocular injuries involve the vitreous humour, retina, optic nerve and choroid as well as posterior segment blood vessel lacerations. They can be as a result of blunt or penetrating injury resulting in either closed or open globe injuries. In some cases there is the retention of a foreign body.

In defining all ocular injuries, the Birmingham Eye Trauma Terminology (BETT) is widely accepted and used to standardize findings on assessment of the eye. It was developed based on extensive experience and repeated reviews of eye injuries².

Worldwide, there are approximately 1.6 million people blind from eye injuries, 2.3 million with bilateral visual impairment and 19 million with unilateral vision loss¹. Trauma in general, is a major cause of disability worldwide and developing countries carry the heaviest burden, and yet they are the least able to afford the costs³.

In Kenya, eye injuries contributed to 2.7% of all ocular morbidity in 2010⁴. There is no study that has been done in Kenya so far to evaluate the characteristics of posterior segment injuries. Consequently, the presentation, management and outcome of treatment for these injuries remain unknown. On the other hand, the overall financial costs of treatment and rehabilitation

can only be estimated as there is no local data on cost of inpatient treatment for eye trauma patients with posterior segment complications.

There exist certain risk factors in general for ocular trauma including age, sex, and socioeconomic status. With regard to available literature, the majority of those injured are young adults with an average age of around 30 years. As Soliman *et al*⁵ and Omolase *et al*⁶ described, the cause of injury is largely dependent on the environment of the population studied and nature of their day to day activities.

MATERIALS AND METHODS

This study was a retrospective case series. The study included all patients with ocular trauma involving posterior segment structures seen at Kikuyu Eye Unit's (KEU) vitreoretinal unit between 1st January 2010 and 31st December 2014. We excluded eyes with severe anterior segment injuries that precluded posterior segment examination as well as those that had missing records.

The list of all ocular trauma cases was identified by carrying out a computer search at the medical records department in Kikuyu Eye Unit. The search was guided by the ICD-10 code for eye injuries. The corresponding patients' hospital files were retrieved from the records department with the help of the hospital's records clerk.

All patients whose eyes sustained posterior segment injuries within the study period and who met the inclusion criteria were identified on perusal of the files by the principal investigator as well as the research assistants. Additional records were sought from the hospital's theatre register to identify patients who had been operated on in the vitreoretinal theatre as a result of trauma. Their relevant data was entered in a pre-designed data collection sheet on perusal of the medical records and then entered in MS Excel spread sheet after checking for completeness.

Prior to the study, ethical approval was obtained from Kikuyu Eye Unit as well as the Kenyatta National Hospital/University of Nairobi Ethics and Research Committee (KNH/UON-ERC).

RESULTS

The study involved 106 eyes of 102 patients in the period from January 2010 to December 2014. Most of the patients were from Kiambu County where the hospital is located. Most of the patients, 73 (71.6%) were male. The male to female ratio was 2.5:1.

The mean age was 27.8 years (range 1-68 years). The age group most affected by injuries involving the posterior segment was between 31-40 years (27.5%) followed closely by the age group between 21-30 years (25.5%). There were 25 children included in the study (Figure 1).

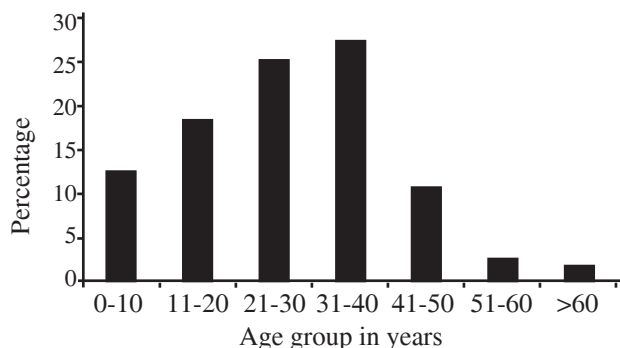


Figure 1: Distribution of patients by age

Seventy nine (74.5%) eyes had closed globe injury while 25.5% had open globe injury. Metal was the most common known agent causing these injuries in 15 (14.7%) eyes. It must however be noted that in 47 (46.1%) cases, the cause of injury was either unknown or unreported (Figure 2).

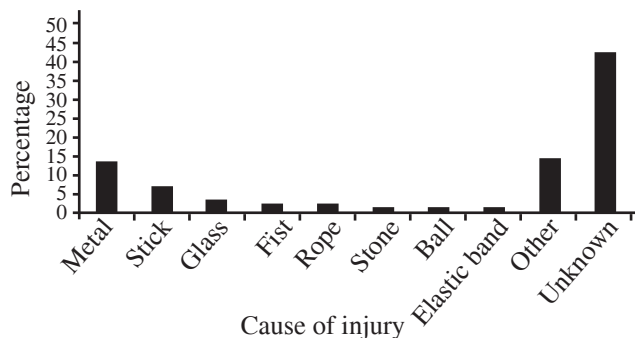


Figure 2: Cause of injury (n=102)

Out of the recorded circumstance of injury, the most common was through Road Traffic Accidents (8.8%) (Figure 3).

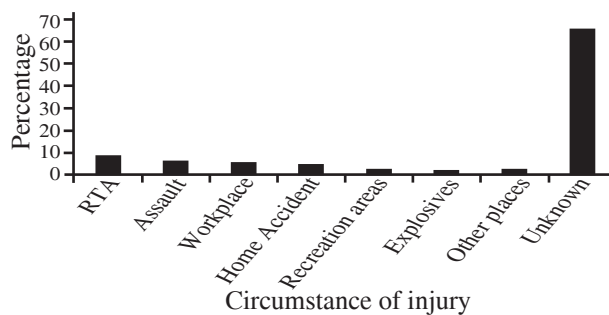


Figure 3: Circumstances of injury among patients (n=102)

Fifty one eyes, (48.1%) had anterior segment involvement alongside posterior segment injury. However, only those with an accessible posterior segment (either by clinical examination or by ultrasound scan) were included in the study.

Seventy (68.60%) patients were self-referral while 20 (19.60%) patients were referred from other health facilities. Seventy two (70.6%) patients did not have treatment as compared to 19(18.6%) who had received treatment prior to presenting at KEU.

Majority of eyes (84.0%) with posterior segment injury during the study period were found to be blind at presentation (<3/60) (Table 1).

Table 1: Visual acuity at presentation

Presenting VA in the injured eye	Frequency (n=106)
6/6 -6/18	3 (2.8%)
<6/18-6/60	9 (8.5%)
<6/60- 3/60	5 (4.7%)
<3/60	89 (84.0%)

Retinal detachment was the most observed finding in 49 (46.2%) eyes and vitreous haemorrhage in 47 (44.3%) eyes. Forty two patients had more than one finding in the same eye (Figure 4).

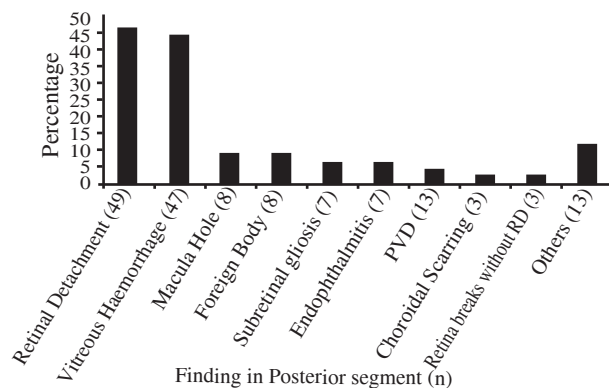


Figure 4: Posterior segment findings at presentation after ocular injury

DISCUSSION

The study involved 106 eyes of 102 patients in the period from January 2010 to December 2014. There was a preponderance of young males to injuries of the posterior segment. This finding is attributed to the social and professional activities that young males are likely to be involved in activities that put them at a higher risk of injury. Young people spend more time outdoors and are also likely to be involved in risky behaviour like taking alcohol, involvement in fights or working without protective wear. According to the USEIR, the male to female ratio is 3.8:1 indicating that even in the developed countries, males are more likely to get eye injuries than females⁷.

After the fifth decade, the risk of injury appeared to reduce. This could be attributed to the fact that older people are less adventurous and their injuries occur in the home environment.

The mean age in our study was 27.8 years (range 1-68 years). There were 25 children (persons who were below sixteen years of age at time of presentation) included in the study. This was comparable to other studies specifically for posterior segment ocular trauma, such as that by Erdurman *et al*⁸ in Turkey who found the mean age of patients to be 26 years. Warrasak *et al*⁹ in Thailand found a mean age of 33.1 years. Soliman *et al*⁵ in Egypt found the average age in ocular trauma in general to be 22 years. Similarly in available but unpublished studies done in Kenya in regard to eye trauma, the commonest age group affected is between 20-40 years.

There was no significant difference in the laterality of the eye affected. Four patients had both eyes injured in the circumstances of assault and road traffic accidents. This is in keeping with USEIR data on ocular injuries where there are more people with unilateral vision loss as compared to people with bilateral visual impairment after ocular injury¹.

In our study, circumstance of injury in most patients was unrecorded (65.7%). Recording of nature, place, source of injury as well as other circumstances surrounding injury on first contact with health care provider is crucial. This comes into play when preventive efforts are needed such as patient education and workplace safety. Notably, medical records are increasingly needed for medicolegal purposes. Out of the recorded causes of injury, metallic objects were found to be the commonest cause (14.7%). Sticks accounted for 7.8% of the injuries. Glass and stone accounted for 3.9% and 2% of the injuries respectively. Other causes of injuries in our study included fist, belts and rubber bands. Our findings however differ from those of Kakembo *et al*¹⁰ in Kenya who found sticks to be the commonest cause in ocular trauma in patients admitted to the national referral hospital's eye ward. Notably however, the highest numbers of cases in that study were in age group between 0-10 years.

In the 25 eyes of children included in this study, the commonest recorded cause of injury was stick in 8 children. Stick injuries in children are as a result of their most common play tool in our set up. As sticks are vegetative material, it is a matter of concern as it increases the risk of endophthalmitis. This compares to Murithi *et al*¹¹ in Kenya in a review of globe injuries in children who found stick to be the commonest causative agent (40.7%) and with the study by Kakembo *et al*¹⁰ who also had a predominance of children in her study and found sticks to be the commonest cause of ocular trauma. However, a prospective study would be useful to verify the above findings as most of the causes of injury were not recorded in the patient records or were unknown.

Road traffic accidents and assault were the commonest circumstances surrounding injury. In Turkey most of the eye injuries involving the posterior segment were work related (26.1%) followed by assault related injuries (19.1%)⁸. In Thailand, the most common causes of injuries were industrial and automobile accident⁹. In Egypt, majority of ocular trauma was due to assault¹⁴. This largely shows circumstances surrounding eye injuries vary from one region to another and may be related to everyday economic activities, work environment policies, transport safety and security.

Most patients (90%) presented after 24 hours of injury. This could have negatively contributed to their final visual outcome. Patients may not be aware of the extent of injury until when significant vision is lost; therefore they seek a specialised eye hospital.

Nineteen (18.6%) eyes received treatment prior to presenting to KEU as compared to 72(70.6%) which did not. This is in keeping with the fact that most patients were self-referrals. The most common treatments received prior were antibiotics and mydriatic eye drops. As most referred patients had already received treatment from the referral centres, this shows that the surrounding facilities are able to give basic eye care prior to referral. Some can give advanced treatment like corneal and scleral repair as well as refer appropriately. In this regard, further vision loss is averted following trauma. Strengthening these primary and secondary eye care facilities in terms of resource is vital in managing minor eye trauma and appropriate referral of major trauma cases.

Studies regarding injuries involving the posterior segment show that closed-globe injuries and sharp penetrating injuries in open globes are significant predictors of good visual outcome^{9,12}. In this study however, we did not find an association of either to the final visual outcome.

Forty eight percent of all eyes had anterior segment involvement alongside posterior segment injury. Ocular injuries involving both anterior and posterior segment have shown to have poor outcomes particularly retinal detachment and presence of RAPD^{13,14}. There is however a paucity of studies comparing anterior segment only injuries with combined anterior and posterior segment injury outcomes. In this study, cataract was the

commonest finding in anterior segment. Erdurman *et al*⁸ found hyphema and cataract to be the most common anterior segment pathology in 29% and 21% of the eyes with posterior segment injuries from ocular contusion that resulted to closed globe injuries.

Retinal detachment (46.2%) and vitreous haemorrhage (44.3%) were the most common presentations after ocular trauma. Retinal detachment also accounted for the most common cause of poor vision. There were 8 (9.4%) eyes with traumatic macula hole as well as the same number of eyes with foreign body lodged in the vitreous or retina. In addition, 42 eyes were found to have more than one finding on examination e.g. vitreous haemorrhage and retinal detachment.

Similarly, Erdurman *et al*⁸ found retinal detachment to be the most frequent pathology (31%) in eyes having contusion injury while vitreous haemorrhage alone occurred in 20% of eyes. In open globes however, retinal detachment has been shown to be higher, occurring in approximately 40–50% of the eyes^{12, 15}. However, final prognosis is similar in eyes with retinal detachment whether secondary to open or closed globe injuries¹⁵. Retinal detachment following open globe injury is also higher than in closed globe among the paediatric age group but the outcome after intervention, like for adults is similar¹⁷.

There were 7 eyes with endophthalmitis at presentation, comprising 26% of all eyes with open globe injury. Diagnosis was made after clinical assessment and on ocular ultrasound. All the 7 eyes with post traumatic endophthalmitis had presented with vision of perception of light (PL). Only 2 had retained foreign bodies. The rate of endophthalmitis has been shown to vary from < 1% to 17%¹⁸. In this study however, the rate of endophthalmitis would be biased due to a small number of eyes with open globes as well as the study focused only on globes with posterior segment involvement. Yang *et al*¹⁹ and Andreoli *et al*²⁰ demonstrated multiple risk factors for endophthalmitis including delay in primary repair, ruptured lens capsule, intraocular foreign body, dirty wounds and intraocular lens placement. However, most authorities agree that the three most important risk factors for posttraumatic endophthalmitis are the presence of an intraocular foreign body, delay in closure of the globe >24 hours, location and extent of laceration¹⁸. In spite of intervention, studies on post traumatic endophthalmitis have shown poor visual outcome with only approximately 44% of the eyes retaining vision better than 20/400^{19, 21}.

Eighty nine eyes (84.0%) were blind at initial review. Therefore, every effort should be made to consult a vitreoretinal unit for timely intervention to save or sustain useful vision. Since most of these injuries are in young patients, a lot of blind years are saved.

Study limitations: The whole eyeball is usually injured in ocular trauma and therefore visual outcome may not entirely be due to posterior segment injuries only.

CONCLUSIONS

Injuries involving the posterior segment were most common in young males. Out of the known circumstances surrounding injury, RTA and physical assault were the most common in this study. Retinal detachment and vitreous haemorrhage were the most common presentations after ocular trauma with retinal detachment accounting for the most common cause of poor vision.

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